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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/670,434	09/23/2003	Pinghai Hao	TI-35470	2415

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TEXAS INSTRUMENTS INCORPORATED
P O BOX 655474, M/S 3999
DALLAS, TX 75265

EXAMINER	
NGUYEN, KHIEM D	
ART UNIT	PAPER NUMBER
2823	

DATE MAILED: 03/31/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/670,434	HAO ET AL.	
	Examiner	Art Unit	
	Khiem D. Nguyen	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 January 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

New Grounds of Rejection

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

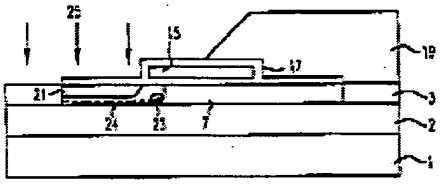
Claims 1-22 are rejected under 35 U.S.C. 102(e) as being anticipated by Nowak et al. (U.S. Patent 6,528,846).

In re claim 1, **Nowak** discloses a method for fabricating a transistor structure, comprising the steps of:

providing a substrate **1** having a surface and a channel region 7;

forming a lightly doped drain (LDD) region **24** in the substrate **1** contiguous to the channel region 7 and the surface (col. 2, line 38 to col. 3, line 26 and FIG. 1D);

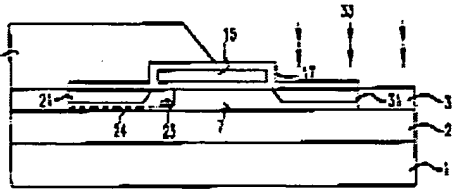
FIG. 1D



implanting a first dopant **25** having a lower dopant concentration (10^{13} atoms/cm^2) (col. 3, lines 2-4) than that of the LDD region **24** (1x 10^{15} atoms/cm^2) into the

lightly doped drain (LDD) region **24** to a depth **21** less than the LDD junction depth **24** (col. 3, lines 2-42 and FIGS. 1D-E); and

FIG.1E



implanting a second dopant **37** into the substrate **1** beyond the LDD junction depth **24** to form a source/drain region **41/39,** the implantation of the second dopant of sufficient dopant concentration (col. 3, line 66 to col. 4, line 5) to overpower a portion of the LDD **24** remote from the channel and a substantial portion of the first dopant to define a floating region **23** of the first dopant completely within the LDD region **24**, the source/drain region **41/39** and the surface and remote from the channel region with inherently reduced dopant concentration relative to the dopant concentration of the LDD region (col. 3, line 43 to col. 4, line 5 and FIGS. 1F-G).

FIG.1F

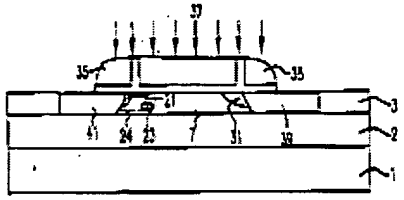
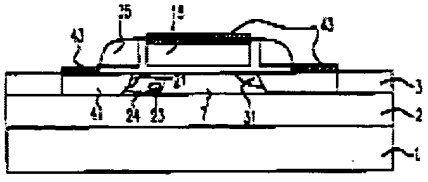


FIG.1G



In re claim 2, **Nowak** discloses that the floating region further comprising a floating ring **23,** substantially self-aligned with an edge of a gate **15** of the transistor structure (FIG. 1G).

In re claim 3, **Nowak** discloses that the method of claim 1, further comprising forming the LDD region **24** by implanting a dose ($1x10^{15}$ atoms/cm^2) of an LDD dopant that is greater than a dose of the first dopant (10^{13}atoms/cm^2) (col. 2, line 61 to col. 3, line 4 and FIGS. 1D-E).

In re claim 4, **Nowak** discloses that the dose of the first dopant **25** being about twenty-percent or less of the dose of the LDD dopant 37 (col. 2, line 61 to col. 4, line 2 and FIGS. 1E and 1F).

In re claim 5, it is well-known to one of ordinary skill in the art at the time of the invention was made that the at least one of the implantation of the first dopant and the implantation of the LDD dopant employing tilted angle implants to enhance an amount of overlap between a gate structure of the transistor structure and the LDD region.

In re claim 6, **Nowak** discloses that the dose of the second dopant **37** being greater than the dose of the LDD dopant **25** (col. 2, line 61 to col. 4, line 2 and FIGS. 1E and 1F).

In re claim 7, **Nowak** discloses that the implantation of the LDD dopant further comprising implanting a dose of n-type dopant in the range from about ($1x10^{13}$ atoms/cm^2), and the implantation of the first dopant **25** further comprising implanting a dose in a range from about (10^{13}-10^{15} atoms/cm^2) of a p-type dopant (col. 2, line 61 to col. 3, line 26).

In re claim 8, **Nowak** discloses that the transistor structure is a complimentary metal oxide semiconductor (CMOS) structure that includes a gate **15** having a side edge portion, the floating region **23** being substantially aligned with the side edge portion of the gate **15** (col. 2, lines 38-58 and FIG. 1E).

In re claim 9, **Nowak** discloses that the CMOS structure is an n-channel CMOS structure, the first dopant **25** forming a shallow region in the LDD region **24** that comprises a p-type dopant (FIGS. 1D-E).

In re claim 10, **Nowak** discloses that the first dopant **25** comprises boron (B), and the floating region **23** further comprises a boron floating ring, substantially aligned with side edge portion of the gate 15 (col. 3, lines 2-26 and FIG. 1G).

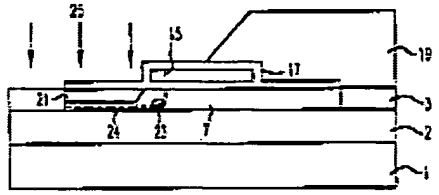
In re claim 11, **Nowak** discloses that the CMOS structure is a p-channel CMOS structure, the first dopant **25** defining a shallow region that comprises an n-type dopant (FIG. 1D).

In re claim 12, **Nowak** discloses that the method of claim 1, further comprising: forming a gate structure **15** above the substrate **1**, the LDD region **24** and the source/drain region **41/39** being formed in the substrate **1** generally around the gate structure **15** the gate structure overlapping at least a substantial portion of the LDD region **24** and the floating ring **23** being substantially aligned with an edge of the gate structure **15** (FIG. 1G).

In re claim 13, **Nowak** discloses a method for fabricating a CMOS transistor device, comprising the steps of: providing a substrate **1** having a surface and a channel

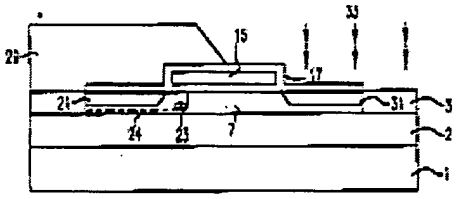
region **7** and forming a gate structure **15** on the substrate **1**, the gate structure **15** having a side edge (col. 2, line 38 to col. 3, line 26 and FIG. 1D);

FIG.1D



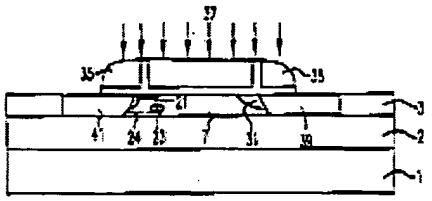
forming a lightly doped drain (LDD) region **24** in the substrate **1** laterally of the channel region **7** and extending to the surface and beneath the gate structure **15** (col. 2, line 61 to col. 3, line 41and FIGS. 1D-E);

FIG.1E



then forming a shallow region **21** in the LDD region **24** having a lower dopant concentration ($1x10^{13}$ atoms/cm^2) than that of the LDD region ($1x10^{15}$ atoms/cm^2) that extends to the surface and into the substrate **1** to a depth that is less than an LDD junction depth **25** and spaced from the channel region **7** (col. 3, lines 2-42 and FIGS. 1D-E); and

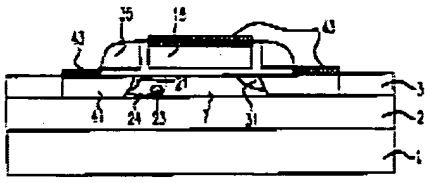
FIG.1F



then forming a source/drain region **41/39**, formation of the source/drain region resulting in forming a floating structure **23** from the shallow region that is located completely within in the LDD region **24,** the source/drain region **41/39** and the surface

and generally aligned with the side edge of the gate structure **15**, the floating structure **23** inherently having reduced dopant concentration relative to the doping concentration of the LDD region (col. 3, line 43 to col. 4, line 5 and FIGS. 1F-G).

FIG.1G



In re claim 14, **Nowak** discloses that the LDD region **24** being formed with a dose ($1x10^{15}$ atoms/cm^2) of a dopant that is greater than a dose of a dopant utilized to form the shallow region (10^{13} atoms/cm^2) (col. 2, line 61 to col. 3, line 4 and FIGS. 1D-E).

In re claim 15, **Nowak** discloses that the dose of the dopant that is utilized to form the shallow region **21** is at least approximately twenty-percent less than the dose of the dopant **25** that is utilized to form the LDD region **24** (col. 2, line 61 to col. 3, line 4 and FIGS. 1D-E).

In re claim 16, **Nowak** discloses the formation of the LDD region **24** further comprising implanting a dose **25** of n-type dopant in a range from about ($1x10^{13}$-$1x10^{15}$ atoms/cm^2), and the formation of the shallow region further comprising implanting a dose in a range (10^{13} atoms/cm^2) (col. 2, line 61 to col. 3, line 4 and FIGS. 1D-E).

In re claim 17, it is well-known to one of ordinary skill in the art at the time of the invention was made that the at least one of the implantation of the formation of the LDD region and the formation of the shallow region further comprising employing tilted angle implants to increase an amount of overlap beneath the gate structure.

In re claim 18, **Nowak** discloses that the formation of the source/drain region **41/39** being implemented with a dose of a dopant that is greater than a dose of a dopant utilized to form each of the LDD region **24** ($1x10^{13}$-$1x10^{15}$ atoms/cm^2) and the shallow region (col. 2, line 61 to col. 4, line 2 and FIGS. 1E and 1F).

In re claim 19, **Nowak** discloses that the CMOS structure is an n-channel CMOS structure, the shallow region comprising a p-type dopant (FIGS. 1D-E).

In re claim 20, **Nowak** discloses that the shallow region comprising boron (B), the floating structure **23** comprising a boron floating ring **23** substantially aligned with the side edge of the gate structure **15** (col. 3, lines 2-26 and FIG. 1G).

In re claim 21, **Nowak** discloses that the CMOS structure is a p-channel CMOS structure, the shallow region comprising an n-type dopant (FIG. 1D).

In re claim 22, **Nowak** discloses a transistor structure formed according to the method of claim 13 (FIG. 1G).

Response to Applicants' Amendment and Arguments

Applicant's arguments with respect to claims 1-22 have been considered but are moot in view of the new ground(s) of rejection.

Applicants contend that no such step "implanting a second dopant into the substrate beyond the LDD junction depth to form a source/drain region, the implanation of the second dopant of sufficient dopant concentration to overpower a portion of the LDD remote from the channel and a substantial portion of the first dopant to define a floating region of the first dopant completely within the LDD region, the source/drain region and the surface and remote from the channel region with reduced dopant

concentration relative to the dopant concentration of the LDD region" is taught or suggested by the reference Fisher (U.S. Patent 6,391,733) herein known as Fisher, either alone or in the combination as claimed.

In response to Applicants' contention that no such step "implanting a second dopant into the substrate beyond the LDD junction depth to form a source/drain region, the implanation of the second dopant of sufficient dopant concentration to overpower a portion of the LDD remote from the channel and a substantial portion of the first dopant to define a floating region of the first dopant completely within the LDD region, the source/drain region and the surface and remote from the channel region with reduced dopant concentration relative to the dopant concentration of the LDD region" is taught or suggested by Fisher either alone or in the combination as claimed. Since Applicants' amendment necessitated the new ground(s) of rejection presented in this Office action, Examiner respectfully submits that Applicants' argument is moot in view of the newly discovered reference to Nowak et al. (U.S. Patent 6,528,846) applied under 35 U.S.C. 102(e) rejection presented in this Office Action.

For this reason, Examiner holds the rejection proper.

Conclusion

Applicants' amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a). A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed

within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khiem D. Nguyen whose telephone number is (571) 272-1865. The examiner can normally be reached on Monday-Friday (8:30 AM - 5:30 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew S. Smith can be reached on (571) 272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

K.N.
March 28, 2006

W. DAVID COLEMAN
PRIMARY EXAMINER